

BCM

APPENDIX J
WASTE DEWATERING CALCULATIONS

APPENDIX J

WASTE DEWATERING CALCULATIONS

1.0 INTRODUCTION

The Raymark landfill is positioned such that a significant portion of the waste is submerged below the water table. The bottom of the waste is approximately 5 feet below the elevation of the regional water table in the vicinity of the site. Due to the nature and composition of the waste present in the landfill and the availability of infiltration, a groundwater mound has formed in the landfill.

The purpose of these calculations is to provide the data necessary to evaluate the feasibility of removing the mounded groundwater from the landfill and the feasibility of removing all the water from the waste by dewatering.

The recovery rate for removal of the mounded groundwater in the waste and removal of the contaminated liquid to a level below the waste is analyzed.

1.1 Removal of the Mound to Regional Groundwater Level

Well points are selected to remove the mound to regional groundwater level. The total volume of the mound above groundwater level is estimated at 5.3×10^6 gallons (see Appendix A). The capacity of well points is computed and compared to observed estimated yields. The capacity of well points is found to vary significantly (see Table A-6-1, Appendix A). This variation is attributed to the variation in spatial hydraulic conductivity of the waste. Based on the variation in the well's capacity, the number of wells necessary to dewater the mound is estimated to lie in the range of 13 to 132. The actual number of wells and their design would depend on pumping test results.

Dewatering of the mound in a short period of time may damage the existing asphalt cap due to differential settlement. Additional analysis is needed to determine the optimal time for recovery.

1.2 Lowering of the Liquid to Below the Bottom of the Waste

Lowering of liquid to below the bottom of the waste requires the construction of a hydraulic barrier at the perimeter of the landfill. The hydraulic barrier is needed to prevent the destruction of neighboring wetlands and induced infiltration of Chickies Creek. However, construction of a hydraulic barrier in the limestone bedrock may not be feasible. Furthermore, the limestone bedrock aquifer is probably

hydraulically connected to the wetlands and/or the stream. Accelerated vertical recharge from the limestone bedrock due to lowering of the water table, therefore, may impact the wetlands and/or the stream. Other impacts of this remediation may be the formation of solution channels, differential settlement of the fill, and failure of the fill.

The total flow during the dewatering period is estimated at 1,388 gpm (see Appendix A). The number of well points needed is estimated to lie in the range of 579 to 6,427.

The total flow during the maintenance period is estimated at 1,347 gpm. The number of wells is estimated to lie in the range of 562 to 6,237 (see Appendix A).

2.0 CALCULATIONS

2.1 Temporary Well Point Groundwater Mound Withdrawal

A. Estimation of the capacity of well points

Sichart's (1930) empirical relationship is useful in predicting capacity of well points (Powers, 1981). Sichart suggests that a practical value of Q_w/A is a function of the square root of permeability, and that it can be expressed as follows:

$$Q_w = 0.035 l_w r_w k^{1/2}$$

Where:

Q_w = Capacity of the well point (gpm)

l_w = Screen length (feet)

r_w = Radius of well (inches)

K = Hydraulic conductivity (gallons per day per square foot)

Assuming a screen length of 3 feet (see Figure 4-1) for the saturated thickness of the mound, a 2-inch diameter well point, and hydraulic conductivity value of 2×10^{-4} cm/sec (see Table 4-3), the capacity of well point is estimated at:

$$Q_w = 0.035 \times 3 \times 2/2 \times (2 \times 10^{-4} \text{ cm/sec} \times 3.281 \times 10^{-2} \text{ ft/cm} \times 60 \text{ sec/min} \times 60 \text{ min/hr} \times 24 \text{ hr/day} \times 7.48 \text{ gal/ft}^3)^{1/2} = 0.216 \text{ gpm.}$$

B. Estimation of the Number of Wells

The total volume of the mound in the fill is estimated at 5.3 million gallons based on planimeter and measurements. This value is derived from the following calculation:

$$\text{volume} = \frac{1/3 \times 7 \times 10.5 \times 43.560}{0.2} = 5.33 \times 10^6 \text{ gallons}$$

Assuming a 6-month recovery period, the dewatering pumping rate is estimated at:

$$Q_{tv} = \frac{5.3 \times 10^6}{(365/2)} = 31,780 \text{ gpd} = 22 \text{ gpm}$$

Additional flow that must be captured is due to infiltration of rainwater. Annual percolation from the bottom of the landfill was estimated using the HELP model, at 445,294 feet³ (see Appendix H). Therefore, total volume of percolation for the 6-month dewatering period is estimated at:

$$V_{pb} = 445,294/2 = 222,647 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3$$

$$V_{pb} = 1,665,399 \text{ gallons}$$

Total pumping rate assuming a 6-month recovery period is given by:

$$Q_t = Q_{tv} + Q_{tp} = 22 \text{ gpm} + \frac{1,665,399 \text{ gallons}}{(365/2) \times 24 \times 60}$$

$$Q_t = 22 \text{ gpm} + 6.34 \text{ gpm} = 28.34 \text{ gpm} = 29 \text{ gpm}$$

Therefore, the total number of wells required:

$$\text{Total number of wells} = 29 \text{ gpm} / 0.216 \text{ gpm} = 132 \text{ wells}$$

As seen in Table A-6-1 of Appendix A, estimated yields of 2-inch wells screened in the fill varied from 0.1 to 2.4 gpm. Therefore, it is anticipated that the spatial variability in permeability is significant.

Assuming that a 2-inch well can yield 2.4 gpm, the number of wells required to pump the mound is estimated at 13 wells.

The actual number of wells and their design will depend on pumping test results.

2.2 Well Points for Removal of the Entire Volume of Water in the Waste and Subsequent Water Level Maintenance

A. Estimation of the volume of liquid to be recovered during the dewatering stage:

The volume of liquid in the fill is estimated from Figure 4-1:

$$\text{Volume} = 2 \frac{(1/3 \times 7 \times 10.5 \times 43,560)}{0.2} = 10.66 \times 10^6 \text{ gallons}$$

Assuming a 6-month period, the volume must be adjusted to incorporate horizontal and vertical inflow. Inflow due to percolation from the landfill was estimated at 445,294 feet³/year (see Appendix H). Assuming that the landfill would be hydraulically isolated from the aquifer using sheet piling, the horizontal inflow is assumed to be negligible compared with the other components of the total flow. The inflow from bedrock is estimated using Darcy's law:

$$Q = k \times i \times A$$

Where:

$$k = \text{permeability of the fill} = 2 \times 10^{-4} \text{ cm/sec}$$

$$i = h_1 - h_2 / L = 1, \text{ since } h_1 - h_2 = L \text{ for vertical flow}$$

$$A = 10.5 \text{ acres} \times 43,560 = 457,380 \text{ feet}^2$$

$$Q \text{ vertical} = 2/10^{-4} \text{ cm/sec} \times 3.281 \times 10^{-2} \text{ ft/cm} \times 60 \text{ sec/min} \times 60 \text{ min/hr} \times 24 \text{ hr/day} \times 457,380 \text{ ft}^2 \times 7.48 \text{ gal/ft}^3 = 1,939,674 \text{ gal/day}$$

Total flow during the 6-month recovery is estimated at:

$$Q_T = \frac{10.66 \times 10^6}{(365/2)} + 1,939,674 + \frac{445,294}{365}$$

$$Q_T = 1,999,305 \text{ gpd} = 1,388 \text{ gpm}$$

- B. The number of wells needed to recover this volume for well capacities of 0.216 gpm and 2.4 gpm is 6,427 and 579, respectively.

2.3 Estimated Number of Wells Required to Maintain Water Below the Waste

- A. The inflow rate is estimated assuming that the flow from the capped landfill and through the slurry wall is negligible compared with the flow from the underlying limestone bedrock. This flow was determined to be 1,939,674 gpd (1,347 gpm).
- B. The number of wells needed to recover the above volume for well capacities of 0.216 gpm and 2.4 gpm is 6,237 and 562, respectively.

APPENDIX K

CALCULATION OF DILUTION RATIOS

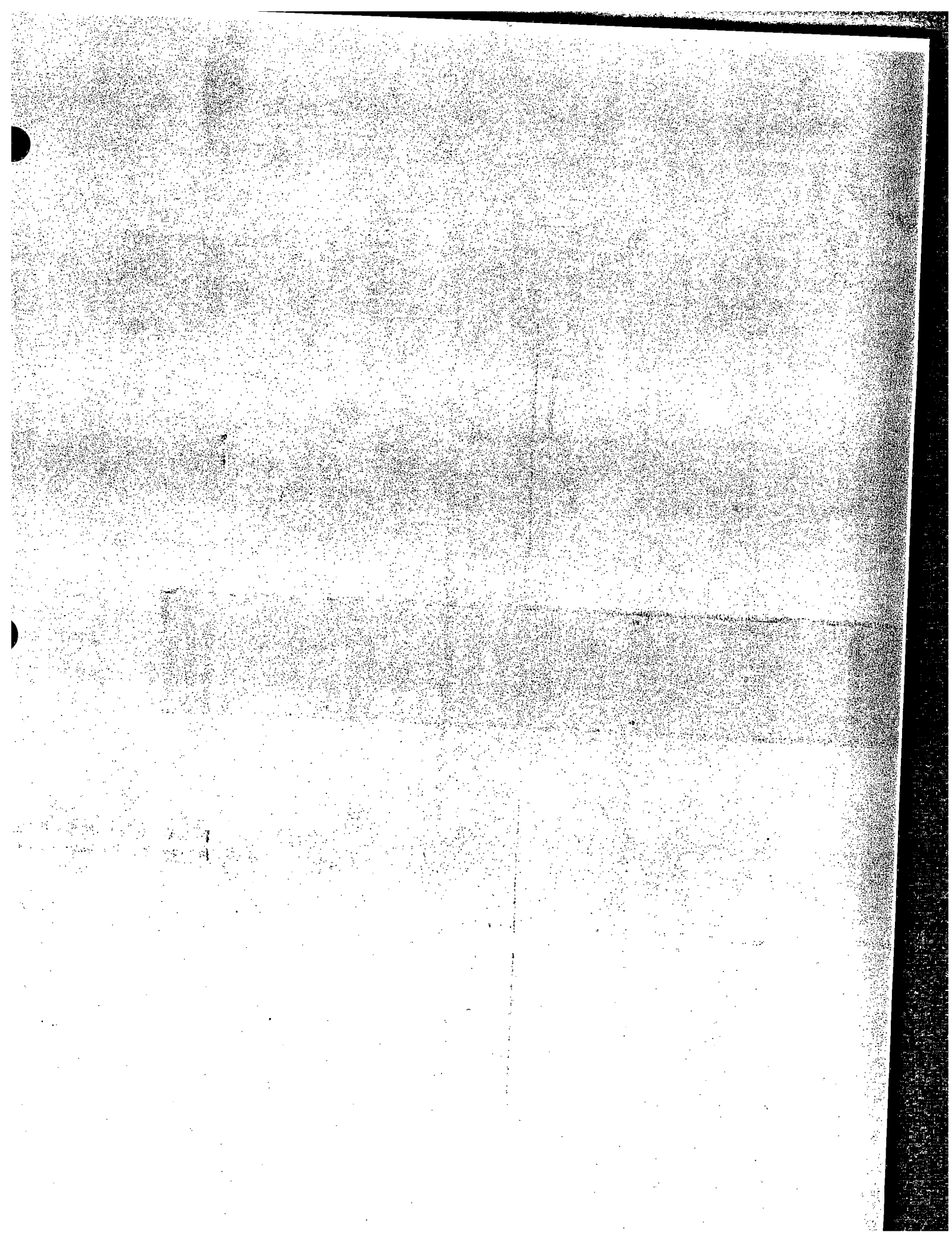
Based on data obtained from PADER publications (B12 - Low Flow Frequency and Flow Duration and B-15 Technical Manual for Estimating Low-Flow Characteristics) a low flow (7-day duration, once in 10-year flow) was estimated for Chickies Creek at Manheim. The data for Conestoga Creek was used and a 7-day, 10-year flow of 0.12 cfs/mi² was determined. Based on USGS topographic maps (Manheim, Lebanon, Lititz, and Richland), the total area above the dilution point (i.e., the downstream perimeter of the landfill) is 23.2 miles. Thus, total 7-day, 10-year flow is 2.8 cfs (1,250 gpm).

Based on the B-15 report, average annual precipitation is 40 inches and potential evapotranspiration (ET) is 28 inches. The actual ET is estimated to be 24 inches. This leaves an estimated total runoff of 16 inches. Based on the terrain, soils, and geology, about 6 inches runs off directly, leaving 10 inches (0.833 feet) available for infiltration.

Using the Manheim USGS topographic map, the area tributary to the landfill is 23 acres. Assuming that all of the water that percolates into this area will come into contact with the waste, this yields 17,300 gpd or 12 gpm.

The dilution ratio based on the above values is 1,250 divided by 12 = 104.

However, the 7-day, 10-year low flow is a low-flow seasonal value while the groundwater recharge (hence groundwater discharge) value is a year-long average. Groundwater discharge will vary with the 7-day, 10-year low flow since it is the groundwater discharge which yields the 7-day, 10-year low stream flow. Thus the actual low-flow seasonal groundwater discharge (August to September) should be one-half or less than one-half of the average groundwater discharge. At one-half the average value (6 ppm), the dilution factor is approximately 200 to 1.



BCM

APPENDIX L
FIELD SURVEY ELEVATIONS OF EXISTING
ASPHALT CAP

* ELEV. SHOT W/ EDM : $\pm 0.20'$ ERROR
 * * ELEV. SHOT W/ LEVEL : $\pm 0.01'$ ERROR

POINT NO.	NORTH	EAST	1986 ELEV *	1990 ELEV **	REMARKS
20	464.2470	-706.7348	409.77	409.87	TRAVELER HUB
38	10.9191	-18.3117	400.24	400.24	INLET; INV = 396.47
39	49.9215	-103.6328	402.73	402.75	INLET; INV = 396.29
40	96.5029	-203.3315	402.05	402.06	INLET; INV = 395.51
41	89.4328	26.1590	404.21	404.22	MACADAM
43	160.4229	-283.3255	NA	405.18	MACADAM @ FENCE CORNER
44	257.9442	-133.7532	407.70	407.74	MACADAM @ FENCE CORNER
45	357.9610	-200.1927	407.70	407.90	MACADAM @ FENCE CORNER
50	565.3072	-289.5303	406.92	407.03	MACADAM
53	184.2065	-409.8132	401.49	401.91	MACADAM
54	189.6269	-400.3175	400.92	400.93	INLET; INV = 394.78
56	175.3925	-395.73	401.50	401.50	MACADAM
12	426.0224	-248.8884	408.31	408.13	MACADAM
4	499.2187	-132.5060	411.74	411.76	MACADAM
38	506.4761	-107.5986	411.77	411.79	MACADAM
9	516.9205	-23.8447	412.16	412.05	MACADAM
0	286.0490	63.8769	409.36	409.18	MACADAM

By BuF Date 3-29-90
 Check by _____ Date _____



FUEHRER ASSOCIATES
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Sheet No. 1 of 3
 Job No. 90-1-7

03/29/90 08141

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FUEHRER ASSOC

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* ELEV. SHOT w/ EDM : $\pm 0.20'$ ERROR
 * * ELEV. SHOT w/ LEVEL : $\pm 0.01'$ ERROR

ST NO.	NORTH	EAST	1986 ELEV. #	1990 ELEV. #	REMARKS
41	388.6083	64.6218	410.68	411.02	MACADAM
42	413.5536	32.5175	412.02	412.03	MACADAM
43	503.2894	-0.4131	411.79	411.69	MACADAM
44	326.5178	-91.2432	408.73	408.70	W-1, MACADAM
			409.54	409.55	W-1, 21M
45	378.8178	14.2641	411.25	411.20	W-2, MACADAM
			412.13	412.14	W-2, 21M
46	205.4251	-406.2100	399.64	399.84	W-3, CROUDED
			400.53	400.63	W-3, 21M
			NA	395.06	W-3, PVC
47	67.1902	-179.3239	402.58	402.61	W-12, MACADAM
			404.90	404.91	W-12, 21M
			404.42	404.41	W-12, PVC
48	331.5444	-82.0261	409.01	408.98	W-13, MACADAM
			411.83	411.81	W-13, 21M
			410.98	410.96	W-13, PVC
49	370.6051	100.7031	412.58	412.81	W-14, CROUDED
			414.96	414.90	W-14, 21M
			414.72	414.64	W-14, PVC
50	498.2570	-192.8156	409.44	409.49	W-15, CROUDED
			412.02	412.01	W-15, 21M
			411.76	411.74	W-15, PVC

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FUEHRER ASSOCIATES
 ENGINEERING & SURVEYING

Sheet No. 2 of 3
 Job No. 90-1-7

03/29/90 08141

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P.03

* ELEV. SHOT W/ EDM : $\pm 0.20'$ ERROR

* * ELEV. SHOT W/ LEVEL : $\pm 0.01'$ ERROR

POINT NO.	NORTH	EAST	1986 ELEV #	1990 ELEV #	REMARKS
159	144.1258	42.4445	406.19 408.61 408.35	406.23 408.60 408.34	W-16, MACADAM W-16, RIM W-16, PVC
882	143.5601	-301.8909	NA	402.18	INLET ; INV. = 395.13

By BLUF Date 3-28-90
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Sheet No. 3 of 3
 Job No. 90-1-7

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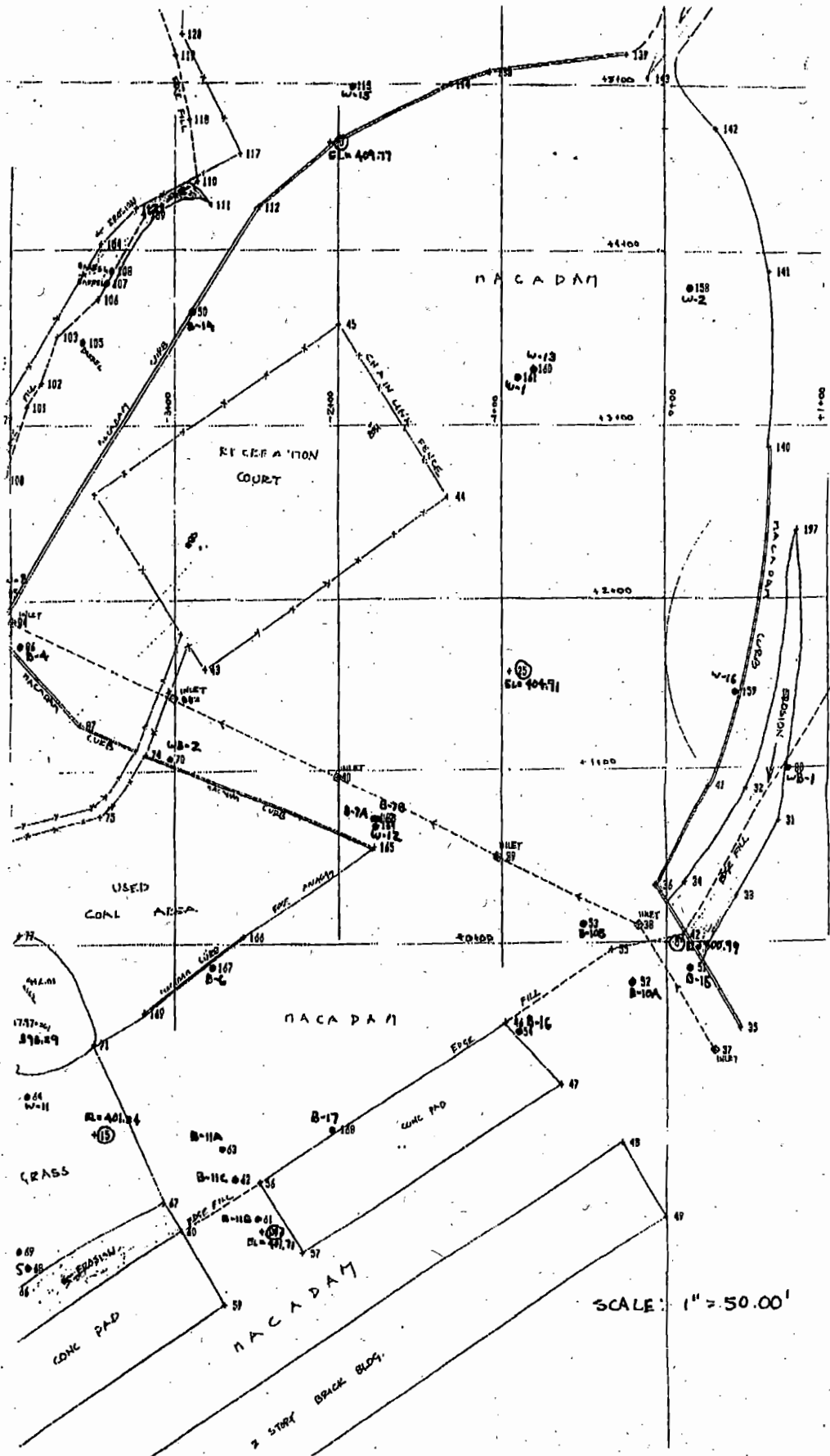
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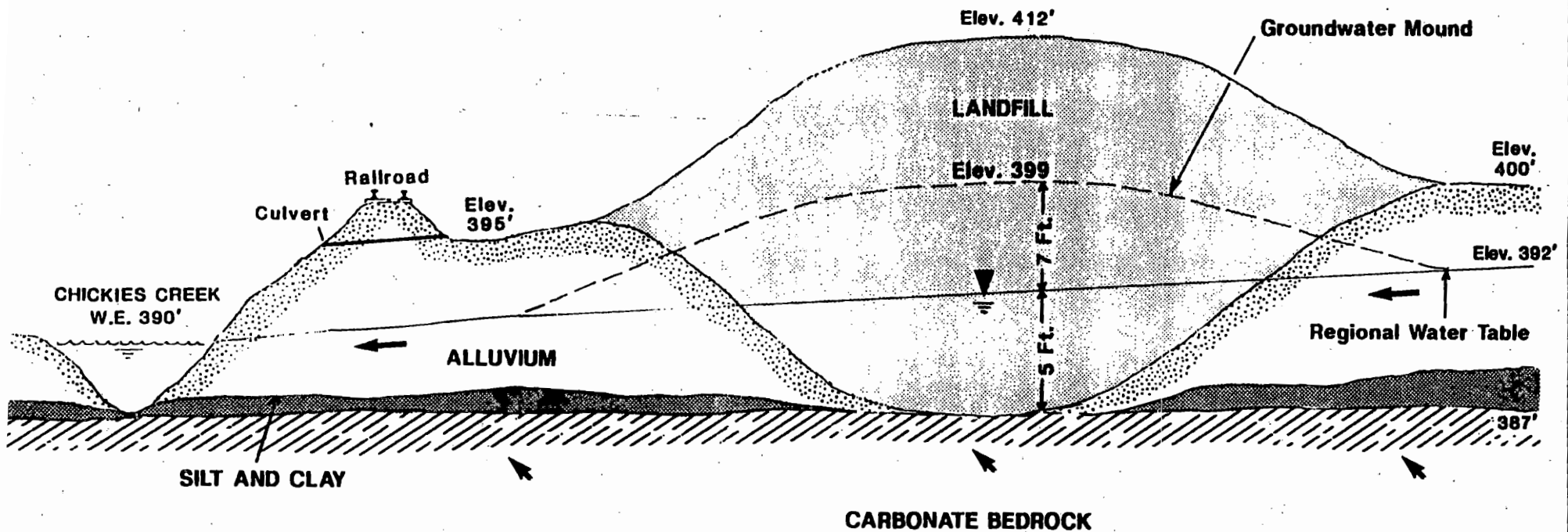




RAYMARK LANDFILL
Manheim, PA

ST

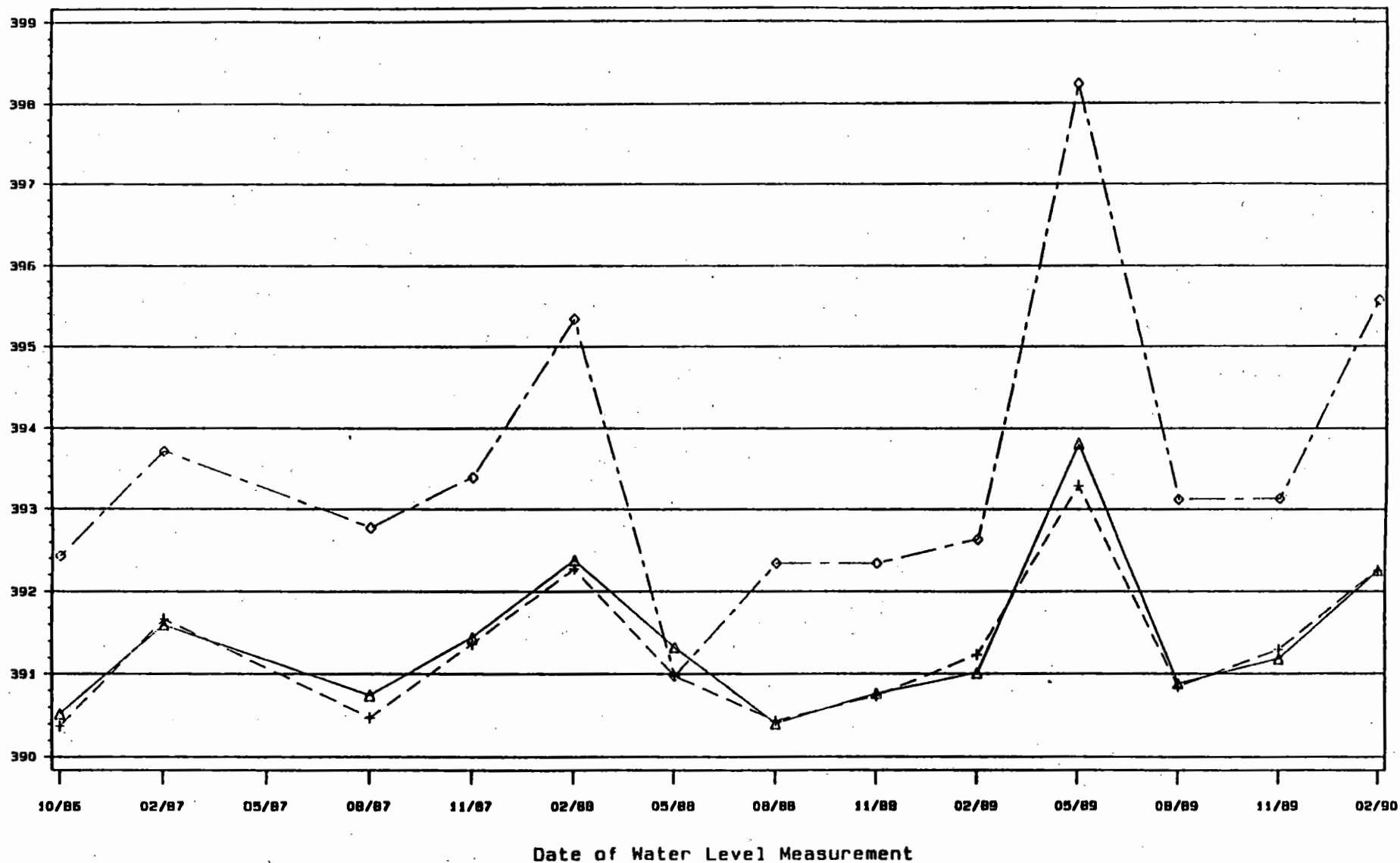
EAST



CM Project No. 00-4174-23

Not to Scale (Vertical Exaggeration)

Figure A-6-3
**Schematic Diagram of
Hydrologic System at Landfill**



+++ Well W-3 (Shallow Bedrock)
 ▲-▲-▲ Well W-10b (Deep Bedrock)

◇-◇-◇

Well W-9 (Alluvial)

FIGURE A-6-4
Groundwater Elevation Data

Raymark Industries, Inc. - Manheim, PA
 Source: BCM Engineers (Project No. 00-23)

ES: - Groundwater elevations measured in feet above mean sea level.

BCM

APPENDIX C
SOILS AND ASPHALT TESTING RESULTS



APPENDIX C

SOILS AND ASPHALT TESTING RESULTS

Summary results of the soils tested indicate:

- Permeability 5.1×10^{-5} - 2.2×10^{-7} cm/sec.
- 90 percent of particles are less than the 200 sieve in 5 out of 6 samples. The bag sample from Test Pit 3 had 75 percent less than 200 sieve.
- USDA Classification - CL
Sandy silty clay to silty clay (Above the A-line of the plasticity chart).

Unified classification properties indicate the soil has:

- Fair shear strength
- Medium compressibility
- Good to fair workability
- Fair to good compaction
- 95 - 120 standard proctor with sheeps foot roller
- Good to fair resistance to piping
- Good to poor ability to take plastic deformation under load without shearing

5120 Butler Pike
Plymouth Meeting
Pennsylvania 19462
215-825-3000
Telex 846-343

Woodward-Clyde Consultants

September 19, 1986
86C2240

BCM Eastern Inc.
One Plymouth Meeting Mall
Floor No. 9
Plymouth Meeting, Pennsylvania 19462

Attention: Mr. John Gee, P.E.

LABORATORY TEST RESULTS RAYMARK INDUSTRIES PROJECT

Gentlemen:

We are pleased to present herein the results of laboratory tests which we performed on three bulk and three shelly tube samples which BCM delivered to our laboratory.

PHYSICAL PROPERTIES

The following physical property tests were performed on all the six samples:

- | | | |
|----|------------------------|------------|
| 1. | Water Content | ASTM D2216 |
| 2. | Atterberg Limits | ASTM D4318 |
| 3. | Specific Gravity | ASTM D854 |
| 4. | Particle-Size Analysis | ASTM D422 |

The results of these tests are presented in Appendix A.

PERMEABILITY TESTS

Permeability tests were conducted on the three shelly tube samples. Vertical specimens were tested in variable head triaxial system using deaired tap water as permeant. The specimens were first consolidated to an effective stress of 5 psi and

then back pressured to 100 psi applied in small increments to ensure an acceptable degree of saturation. The results of the permeability tests on all the samples tested are summarized in Table 1. The values of the vertical coefficient of permeability were temperature corrected to 20°C.

It has been our pleasure working with you and we look forward to being of continued service to you on this project. Should you have any questions regarding this report please do not hesitate to contact us.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

Ram D. Singh

Ram D. Singh, Ph.D
Laboratory Director

RDS/vbg/48B



Table



TABLE 1
SUMMARY OF PERMEABILITY TEST
BCM - RAYMARK INDUSTRIES PROJECT

Boring	Sample	Depth (ft.)	Initial			Final		
			Moisture Content	Dry Density	Saturation	Moisture Content	Saturation	k* (cm/sec.)
TP-1	ST-2	0.75	23.9	94.5	83.4	27.8	96.7	5.1×10^{-5}
TP-2	ST-1	0.70	25.2	97.4	92.5	25.7	98.7	2.2×10^{-7}
TP-3	ST-1	0.85	18.3	105.8	83.9	21.9	99.1	1.8×10^{-5}

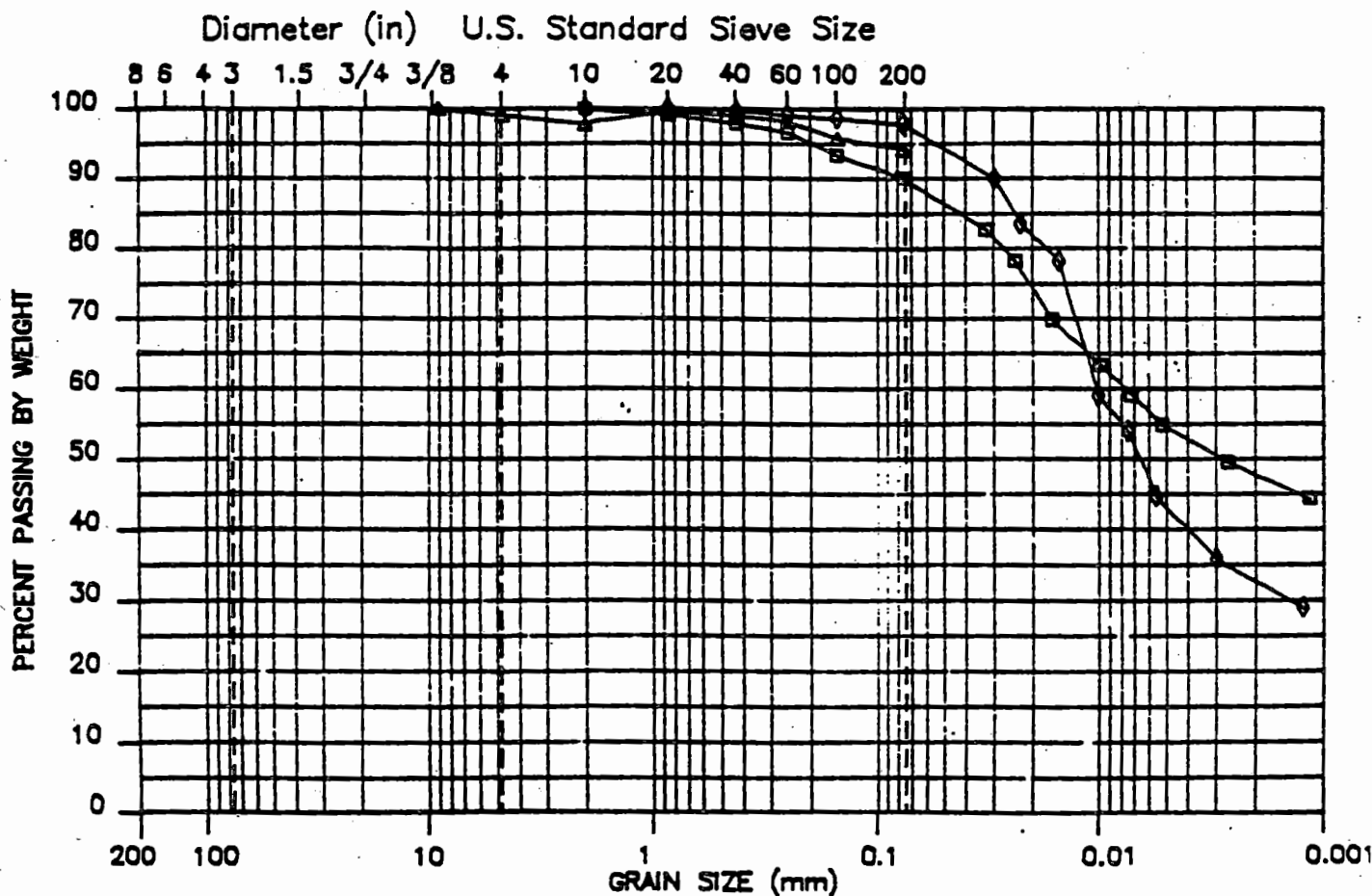
* Coefficient of Permeability corrected to 20°C.

Appendix

WOODWARD-CLYDE PLYMOUTH MEETING LABORATORY

PARTICLE-SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



JOB NUMBER : 86C2240

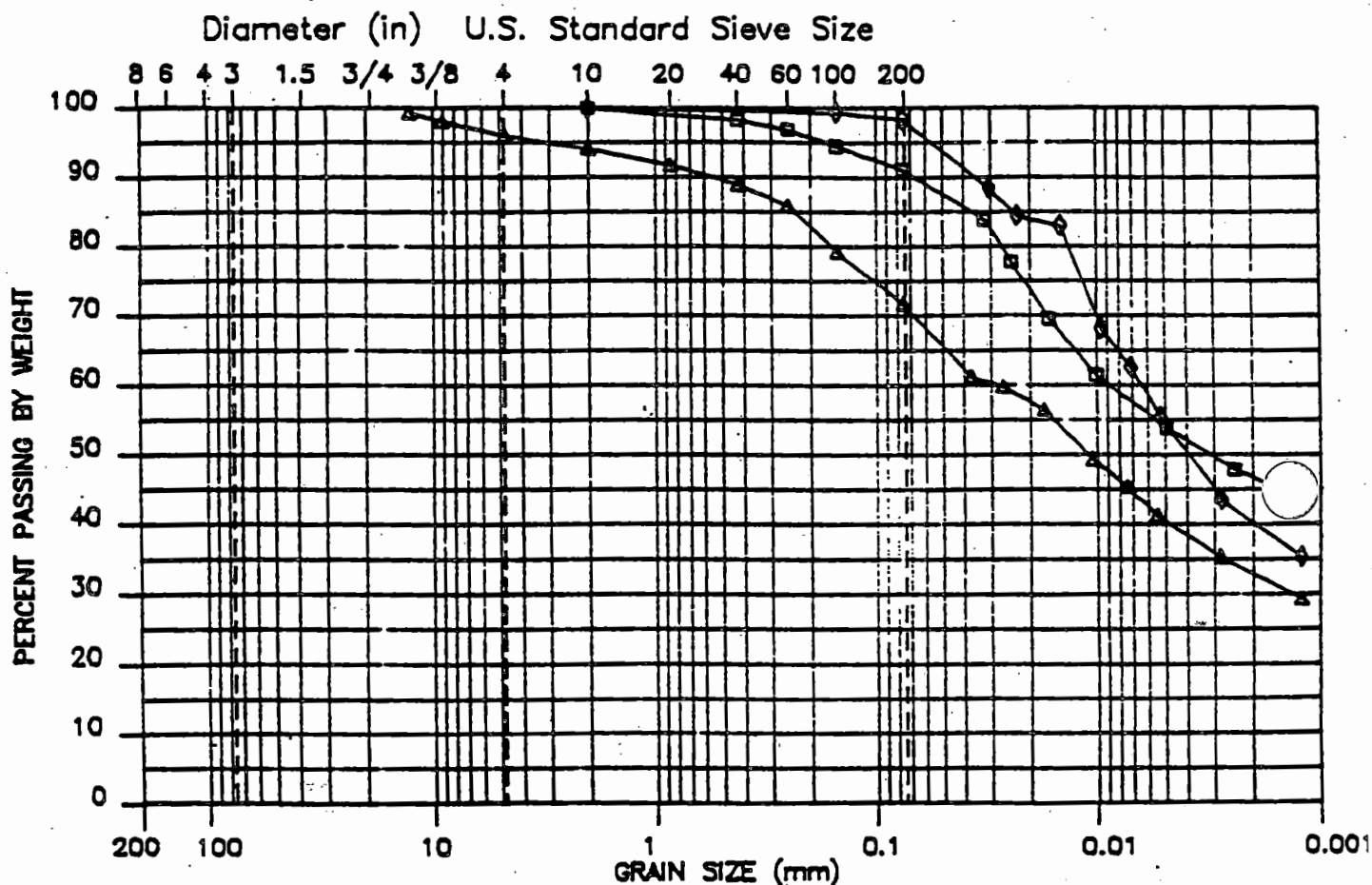
JOB NAME : B.C.M

SYM	BORING	SAMPLE	DEPTH	DESCRIPTION	W(%)	W _L (%)	W _p (%)
□	TP-1	ST-1	.75	TAN FINE SANDY SILTY CLAY		45	20
△	TP-2	ST-1	0.70	TAN MEDIUM TO FINE SANDY SILTY CLAY		38	21
◇	TP-3	ST-1	0.85	TAN TAN SILTY CLAY		34	18

WOODWARD-CLYDE PLYMOUTH MEETING LABORATORY

PARTICLE-SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



5120 Butler Pike
Plymouth Meeting
Pennsylvania 19462
215-825-3000
Telex 846-343

Woodward-Clyde Consultants

January 13, 1987
86C2240

B.C.M. Eastern Inc.
One Plymouth Meeting Mall
Plymouth Meeting, PA 19462

Attention: Mr. John Gee, P.E.

Re: Permeability Test for Raymark

Gentlemen:

We are pleased to present herewith the result of the laboratory test that you requested. The core (asphalt) sample was delivered to our laboratory on the October 21, 1986 by the representative of B.C.M.

The core sample received was tested at the section that was designated by B.C.M. sample preparation involved cutting the core using our diamond bit circular saw and lapped with a diamond bit grinder.

A permeability test was conducted in our specially designed WCC "close loop, constant volume, variable-head" triaxial permeater system. The sample was first consolidated using 1.08 tsf and then back-pressured to about 5.03 tsf to ensure a acceptable degree of saturation. The results are as follows:

Initial total density = 130.6 pcf
Coefficient of permeability = 3.2×10^{-5} cm/sec

It has been our pleasure working with you on this task. If you have any questions or if we can be of further service, please call.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS


Enrique N. Manuel
Laboratory Supervisor

ENM/smp/30B

5120 Butler Pike
Plymouth Meeting
Pennsylvania 19462
215-825-3000
Fax 215-834-0234

Woodward-Clyde Consultants

February 6, 1990
89C2896

BCM Engineers
One Plymouth Meeting
Plymouth Meeting, PA 19462

Attention: Mr. Daniel T. Guest
Senior Engineer

GEOTECHNICAL CHARACTERIZATION OF WASTE RAYMARK INDUSTRIES MANHEIM, PENNSYLVANIA

Gentlemen:

We are pleased to present herein our report of a waste characterization study in connection with capping of an industrial waste landfill in Manheim, Pennsylvania. The purpose of this study was to assess the potential for long-term settlement of the landfill crest after capping with an asphalt cover. The material in the landfill is reported by BCM Engineers to consist of scrubber waste, and to have been in place for a period of several years.

Two test borings were performed at the landfill on December 18, 1989, under the technical direction of BCM Engineers. Logs of the borings, interpreted by Woodward-Clyde Consultants (WCC) from BCM field logs, are enclosed in Appendix A. The borings were drilled to total depths of 18.8 and 20.0 feet, respectively. Below a clay cap, ranging in thickness from about 1 to 3 feet, the borings encountered black and brown fibrous waste material, with occasional inclusions of cement fragments and cloth. Standard penetration test blowcounts ranged from 1 to 9 blows per foot, generally decreasing with depth. In addition to disturbed split-spoon samples, several Shelby tube samples were also obtained for consolidation testing. The waste materials were found to extend to depths of 13.7 and 18.0 feet, respectively, in the two borings.

One Shelby tube from each boring was selected for physical property and consolidation testing. In addition, the Shelby tube samples and one jar sample from each boring were tested for pH and total organic carbon. The testing was performed by J & L

Testing Company, Inc., of Canonsburg, Pennsylvania. The individual test results are presented in Appendix B, and are discussed below.

The physical property test results indicate the scrubber waste to be non-plastic medium to fine sand, with trace silt, although the consolidation test specimens were visually described as clayey silt with asbestos by the laboratory technician. Natural water content ranged from 63.1 to 102.8 percent, and organic content from 27.9 to 31.0 percent. The specific gravity ranged from 2.24 to 2.34 and the pH from 6.8 to 7.5.

The consolidation test from Boring B-100 was performed on the stiffer, upper material and is believed to be representative of material with a blowcount greater than 3 blows per foot. This sample was found to behave as a pre-compressed material having a preconsolidation pressure on the order of 2 to 3 tons per square foot. The pre-compression may be due to traffic on the surface of the landfill, or to compaction or desiccation during placement of the uppermost several feet of waste. The pre-compressed materials would have relatively low compressibility until loaded to a pressure above the pre-consolidation pressure. The test indicates that consolidation under load would occur rapidly.

The consolidation test from Boring B-101 was performed on the softer, deeper material in the landfill. These samples would be representative of material having a blowcount of less than 3 blows per foot. As would be anticipated, this sample behaved as a normally consolidated soil. Consequently, the materials below a depth of about 5 to 8 feet in the landfill would be expected to exhibit a relative high compressibility under any magnitude of loading. Similarly to the other sample, the test indicates that consolidation would occur rapidly.

An analysis was performed to estimate the amount of future settlement which could be expected due to the weight of the proposed cap. It is understood that the cap will consist of approximately 3 inches of bituminous pavement and 8 inches of aggregate. The weight of the cap is not expected to exceed 150 pounds per square foot. Based on the consolidation test results, it is estimated that approximately 3 to 4 inches of settlement could occur, although it is believed that the actual settlement would probably

be less. Due to the unsaturated condition of the scrubber waste, it is anticipated that the majority of the settlement would occur relatively rapidly after construction, within a period of a few days to a few weeks. The post-construction settlement of the asphalt liner could be reduced if the aggregate base course is placed and compacted, and then left in place for two weeks prior to placement of the asphalt. Due to the age of the landfill, it is believed that it is essentially in equilibrium at the present time with respect to its own self-weight, and that any ongoing settlement in addition to that created by the weight of the proposed cap would be small.

It has been our pleasure to be of assistance to you on this project. If you have any questions concerning this data, or if we may be of any further service, please do not hesitate to contact us.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS



Arthur H. Dvinoff, Ph.D., P.E.
Senior Associate

AHD/smp

Appendix 1

LOG of BORING No.

B-100

DATE 12/18/89

SURFACE ELEVATION 0.0⁽¹⁾

LOCATION

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Black to dark brown sandy clay, becoming red-brown clay with trace fine sand at 3 feet	-3.2				
5	9		Black to dark brown fibrous scrubber waste		68.4	NP	NP	M, C
10	3		-large cement fragment at 13 feet		79.0			
15	7		Dark brown, black, and orange-brown clay, trace sand, becoming more sandy with depth	-13.7				
20	P	100 3"		-18.8				
<p>Notes:</p> <p>(1) Ground surface elevation arbitrarily assumed at 0.0.</p> <p>(2) Boring log interpreted from BCM Engineers field log.</p>								

Completion Depth 18.8 Feet Water Depth Feet Date 12/18/89
 Project Name Raymark Industries, Manhiem, PA Project Number 89C2896

LOG of BORING No. B-101DATE 12/18/89SURFACE ELEVATION 0.0⁽¹⁾

LOCATION _____

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Red-brown sandy clay	-1.0				
6	P		Black fibrous scrubber waste with occasional large black cement fragments and cloth		80.0			
10	P				102.8	NP	NP	M, C
15	P		Dark brown sandy silt, some medium to fine sand, trace coarse sand, moist	-18.0				
20		21		-20.0				
			Notes: (1) Ground surface elevation arbitrarily assumed at 0.0. (2) Boring log interpreted from BCM Engineers field log.					

Completion Depth 20.0 Feet

Water Depth _____ Feet

Date 12/18/89Project Name Raymark Industries, Manhiem, PAProject Number 89C2896

Appendix I



SHELBY TUBE LABORATORY RECORD

PROJECT NO. 89S731-01 BORING NO. 100
PROJECT NAME Woodward Clyde - PCM - Baymark SHELBY TUBE NO.
TESTED BY DEF DATE 12-27-99 DEPTH PUSHED 5.0 TO 7.0
CALCULATED BY DEF DATE 12-29-99 GROUND SURFACE ELEVATION
CHECKED BY DATE TUBE ELEVATION TO
TUBE RECOVERY

SOIL PROFILE AND SAMPLING

DEPTH (\pm)	ELEV. (\pm)	SECTION NO.	SOIL PROFILE	SOIL DESCRIPTION AND REMARKS	TEST PERFORMED
5.0				<u>UNIT 1</u> Zones 211.6 Zones 306.9 DR. GRAY CLAY/SILT AND A-BEADS, SOME FINE WOOD FRAGMENTS	
6.0					
6.5		3			
6.7		2			
7.0		1	NO WAX		
					8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100

NOTE: WHEN FULL RECOVERY IS NOT ACHIEVED, SOIL ELEVATION CAN NOT BE ACCURATELY DEFINED

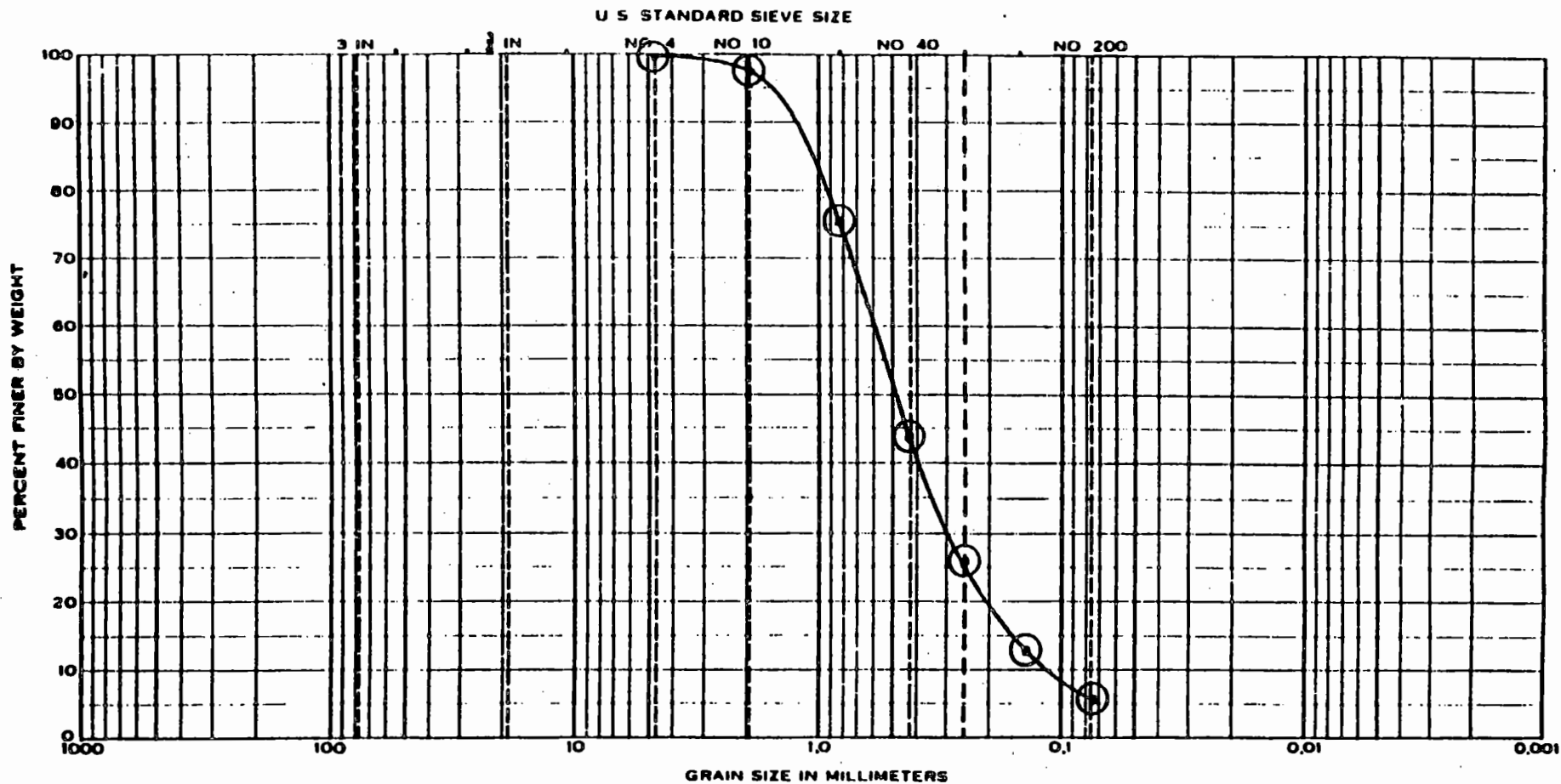
INDICATE EACH CUT OF THE TUBE WITH AN ARROW
INDICATE EACH SOIL CUT (AFTER EXTRUDING) BY A BROKEN LINE-----
INDICATE DIVIDING LINE BETWEEN SOIL TYPES BY A SOLID LINE=====
INDICATE WAX BY CROSS-HATCHING
INDICATE SOIL TYPES BY STANDARD SYMBOLS

WATER CONTENT

SECTION NUMBER	1	2	3						
TARE NUMBER	M-977	M-905	M-433						
WT TARE + WS. gm	119.1	36.5	62.4						
WT TARE + DS. gm	74.1	56.0	379.4						
WT WATER. gm	—	—	—						
WT TARE. gm	7.7	7.7	7.7						
WT DS. gm	—	—	—						
WATER CONTENT, %	67.3	63.1	66.5						

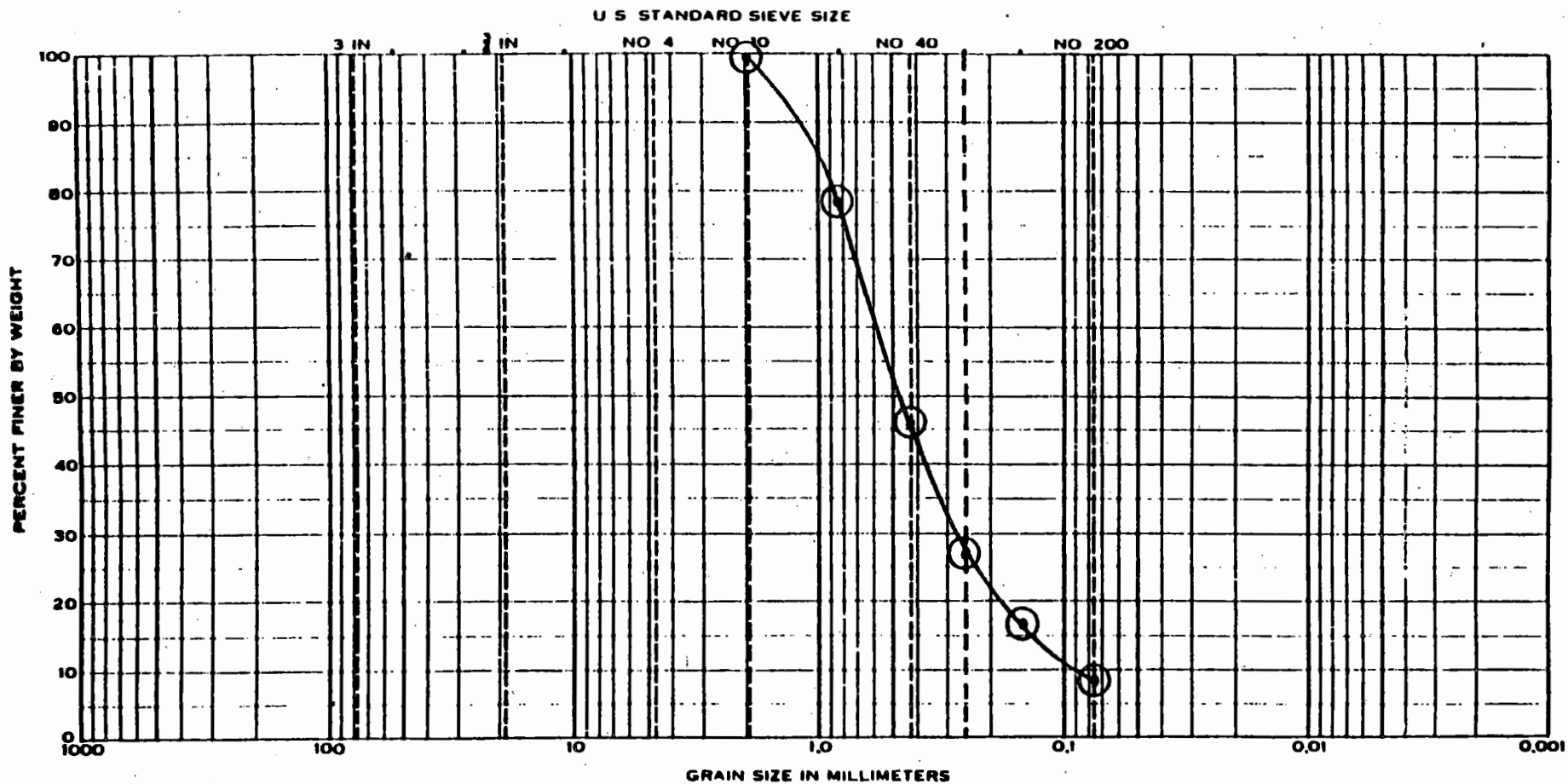
NATURAL DENSITY

1	WT TARE + WS. gm	52.4	753.4						
2	WT TARE. gm	121.3	339.4						
	WT WS. gm	357.0	419.0						
	CIRCUMFERENCE. cm	2.87	2.87						
	LENGTH. in	2.62	4.65						
3	LENGTH. cm	6.65	11.81						
4	AREA. cm ²	41.74	41.74						
	UNIT WET WT. gm/cm ³	1.296	1.256						
5	62.4	—	—						
	UNIT WET WT. pcf	80.3	78.4						
6	WATER CONTENT	0.631	0.665						
7	CONSTANT 1	—	—						
	UNIT DRY WT. pcf	49.2	47.1						
	UNIT DRY WT. gm/cm ³	—	—						
8	SG (ASSUMED/MEASURED)	—	—						
9	CONSTANT 1	—	—						



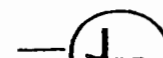
COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample No.	Elev or Depth	Classification	NatWC	LL	PL	PI	Project
B-100	5.0'-7.0'	*See Tube Log	*	NP	NP	NP	Woodward Clyde
							BCM-Raymark
GRADATION CURVES							Date 2/2/90 Job No 90S731-01

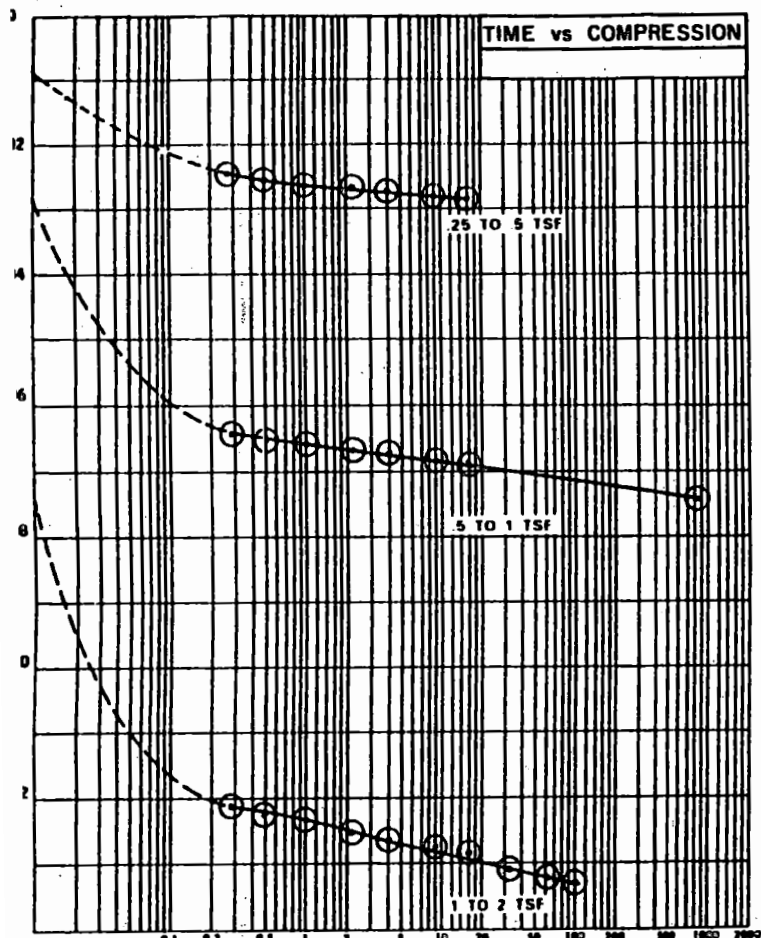


COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

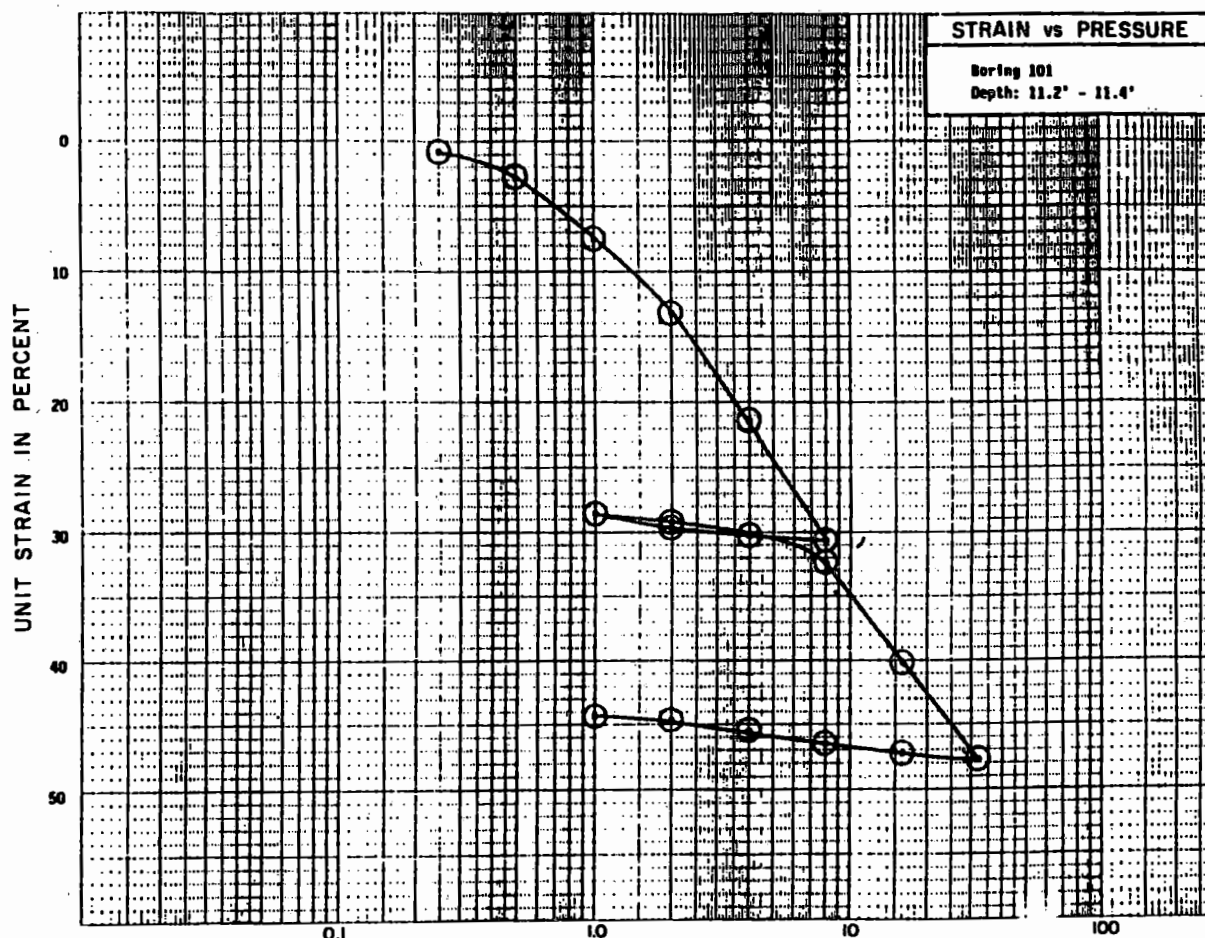
Sample No.	Elev or Depth	Classification	NatWC	LL	PL	PI	Project
B-101	10' - 12.5'		*	NP	NP	NP	Woodward Clyde
		* See Tube Log					BCM-Raymark
							Project No. 89C2896
GRADATION CURVES							Date 2/2/90
							Job No 905731-01



J & L TESTING COMPANY, INC.



TIME IN MINUTES



PRESSURE IN TONS PER SQ. FT.

CURVE NUMBER	PRESSURE INCREMENT		COEFFICIENT OF CONS. (cm ² /sec)	DESCRIPTION OF SPECIMEN: Dark Gray Clayey Silt and Asbestos, Some Fine Wood Fragments	CONSOLIDATION TEST		
	FROM (tsf)	TO (tsf)			TEST SPECIMEN PROPERTIES	INITIAL	FINAL
				COMPRESSION INDEX (UNIT STRAIN)	WATER CONTENT, %	102.8	55.8
				RECOMPRESSION INDEX (UNIT STRAIN)	VOID RATIO	2.866	1.242
				SWELLING INDEX	SATURATION, %	90.3	100
				PRECONSOLIDATION STRESS, tsf	SAMPLE HEIGHT, in.	1.00	0.58
				EXISTING OVERBURDEN STRESS, tsf	UNIT DRY WEIGHT, pcf	36.1	65.1
					SAMPLE DIAMETER, in.	2.50	
					LIQUID LIMIT, %	---	
					PLASTIC LIMIT, %	---	
				FROM VOLUMETRIC STRAIN	SPECIFIC GRAVITY	2.24	



J & L TESTING COMPANY

Geotechnical Testing

TESTED BY:
DEF

CHKD BY:
DAG

DATE:
12/27/89

JOB No.
895731-01



APPENDIX D
TEST PIT LOGS



TEST PIT LOG

TEST PIT NO: TP1

PROJECT NO: 4174-20

CLIENT: Raymark

LOCATION: Manheim

TEST PIT LOCATION: East of active fill area in open field just past roadway.

EXCAVATION CONTRACTOR: Hadelman

DATE STARTED: 8/7/85 TIME: 10:00

EXCAVATION EQUIPMENT: Backhoe

DATE BACKFILLED: 8/7/86 TIME: 10:30

SAMPLE TYPE: Shelby Tube, Bag Sample

GROUND ELEVATION: 404.15

ELEVATION DATUM: ---

DEPTH TO WATER TABLE: ---

TOTAL PIT DEPTH: 4 ft

TOTAL PIT LENGTH: 8 ft

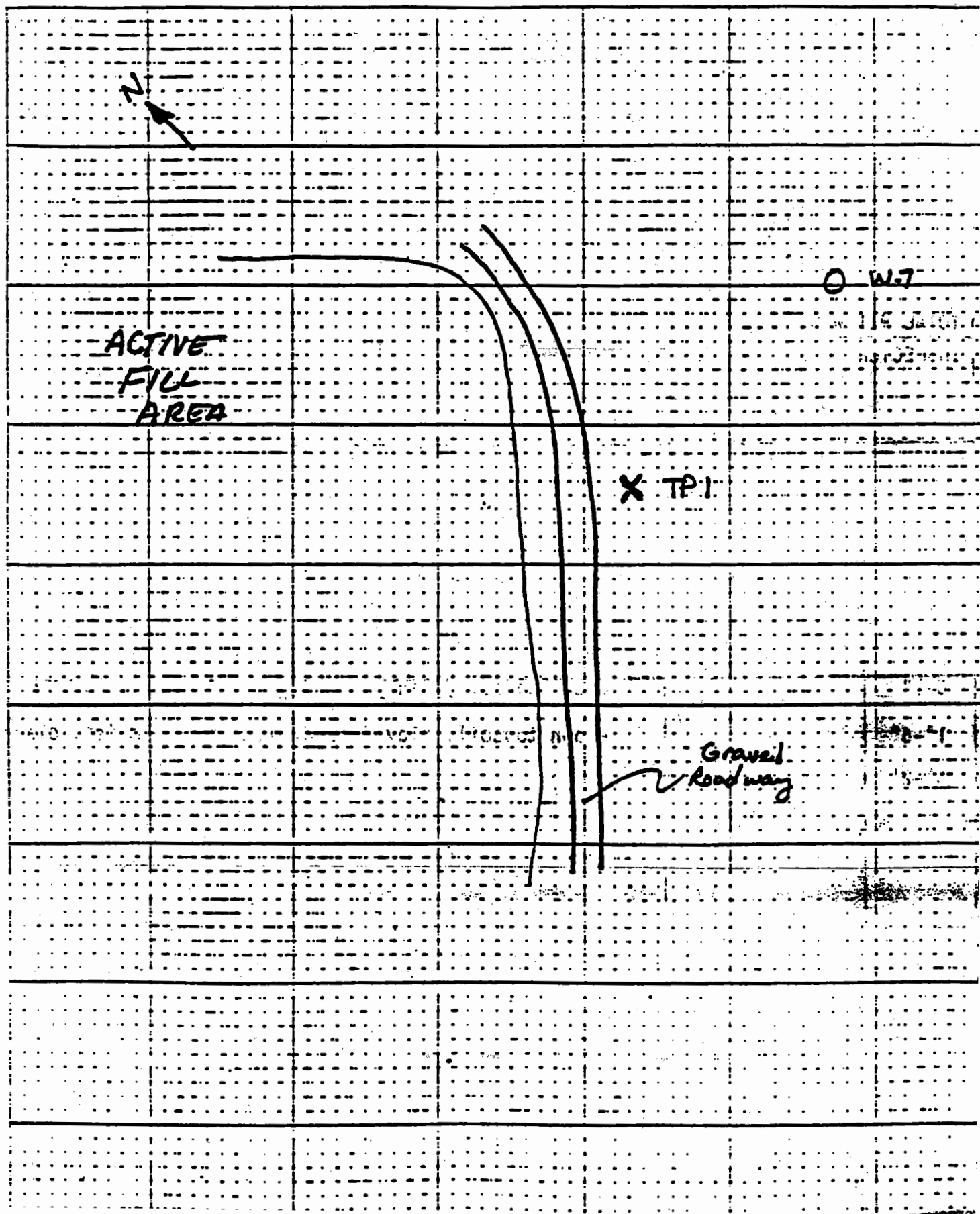
TOTAL PIT WIDTH: 4 ft

INSPECTOR: John Donnell

COMMENTS: Clay layer appears 1.5' thick

DEPTH	MOISTURE CONTENT	DESCRIPTION OF SOIL (COLOR, GRAIN SIZE, TEXTURE, STRUCTURE, BOUNDARIES, FILL MATERIAL DESCRIPTION)
0-1"		Black topsoil, sandy
1"-6"		Brown topsoil, clay & sand, very fine & moist, clayey
6"-2'		Brown clay, small pebbles mixed in, 1 horizontal gr clay seam noted 6" - 1', photograph taken
2'-4'		Weathered bedrock

Test Pit Location Sketch Map





TEST PIT LOG

TEST PIT NO: TP-2

PROJECT NO: 4174-20

CLIENT: Raymark

LOCATION: Manheim

TEST PIT LOCATION: East of roadway heading toward W-8 in clearing, west of crown ve

EXCAVATION CONTRACTOR: Hadelman

DATE STARTED: 8/7/86 TIME: 11:00

EXCAVATION EQUIPMENT: Backhoe

DATE BACKFILLED: 8/7/86 TIME: 11:30

SAMPLE TYPE: None

GROUND ELEVATION: 396.71

ELEVATION DATUM: ---

DEPTH TO WATER TABLE: 2.5' (approx.)

TOTAL PIT DEPTH: 4'

TOTAL PIT LENGTH: 8'

TOTAL PIT WIDTH: 4'

INSPECTOR: John Donnell

COMMENTS: Clay layer approximately 1.5' thick, pebbles and sand mixed in

DEPTH	MOISTURE CONTENT	DESCRIPTION OF SOIL (COLOR, GRAIN SIZE, TEXTURE, STRUCTURE, BOUNDARIES, FILL MATERIAL DESCRIPTION)
0-1'		Topsoil - Dark, grayish black, claylike, fine
1'-2'		Brown clay - small pebbles mixed in, some light b sand, gray clay areas
2'-2.5'		Gray clay with brown clay and sand
2.5'-4'		Gravel with sand, clay - darker brown soil above. Bigger rocks mixed in, very wet. Water t at 2.5'

Test Pit Location Sketch Map

AT

Active File

N-4

Crown
Rehl
TP2

MS



TEST PIT LOG

TEST PIT NO: TP-3

PROJECT NO: 4174-20

CLIENT: Raymark

LOCATION: Manheim

TEST PIT LOCATION: Northwest of W-4 in open field

EXCAVATION CONTRACTOR: Hadelman

DATE STARTED: 8/7/86 TIME: 12:

EXCAVATION EQUIPMENT: Backhoe

DATE BACKFILLED: 8/7/86 TIME: 12:

SAMPLE TYPE: Shelby Tube, Bag Sample

GROUND ELEVATION: 397.04

ELEVATION DATUM: ---

DEPTH TO WATER TABLE: ---

TOTAL PIT DEPTH: 5'

TOTAL PIT LENGTH: 8'

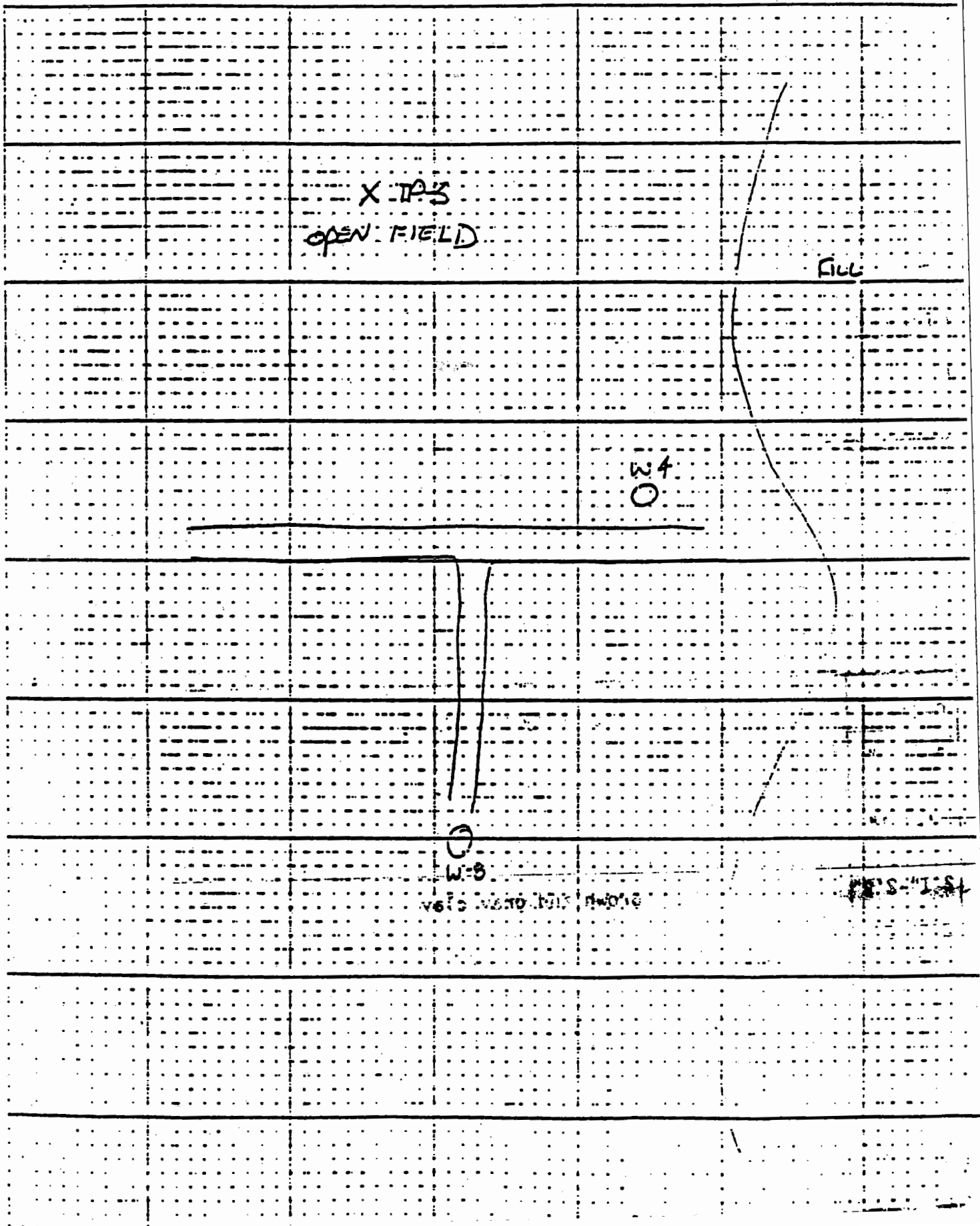
TOTAL PIT WIDTH: 4'

INSPECTOR: John Donnell

COMMENTS: 3' layer of clay, quite dense

DEPTH	MOISTURE CONTENT	DESCRIPTION OF SOIL (COLOR, GRAIN SIZE, TEXTURE, STRUCTURE, BOUNDARIES, FILL MATERIAL DESCRIPTION)
0-2"		Black/gray topsoil, fine clayey
2"-1'0"		Light tan clay with gray clay, vertical seam 1' (photograph)
1'-2'1"		All gray clay, one darker vertical gray seam, pockets of brown clay in lower layer
2'1"-2'9"		Brown and gray clay
2'9"-5'		Dark brown sand and gravel, small pebbles mixed in

Test Pit Location Sketch Map



BCM

APPENDIX E
TEST BORING AND WELL LOGS

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 10
BORING B1

<u>LOG</u>	<u>DESCRIPTION</u>
0-3.5	Silty Topsoil
3.5-5	Weathered Bedrock
5-19	Limestone

COMPLETED: 5/14/75
ELEVATION (TOC): 401.8'
TOTAL DEPTH: 19'
TOTAL CASED: 19' (slotted)
ESTIMATED YIELD: Unknown
PROBABLE WATER ZONE: 5'

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 11

BORING B2

<u>LOG</u>	<u>DESCRIPTION</u>
0-4.5	Fill
4.5-13	Gravelly Subsoil
16-16.5	Broken Rock
16.5-19	Limestone

COMPLETED: 5/14/75

ELEVATION (TOC): 69" 404.5'

TOTAL DEPTH: 19'

TOTAL CASED: 19' (slotted)

ESTIMATED YIELD: Unknown

PROBABLE WATER ZONE: 8'

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY,
LANDFILL MONITORING WELLS

MONITORING POINT 12

BORING B3

<u>LOG</u>	<u>DESCRIPTION</u>
0-12	Topsoil
12-16	Weathered Bedrock

COMPLETED: 5/14/75

ELEVATION (TOC): 398.4'

TOTAL DEPTH: 16'

TOTAL CASED: 16' (slotted)

ESTIMATED YIELD: Unknown

WATER ZONE: 5'



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-4

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Southwest of Tennis Courts

DATE(S)
DRILLED: 07/18/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Hollow Stem AugerBORING
DIAMETER: 6"SAMPLING
METHOD: Split-SpoonTOTAL
DEPTH: 12'BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER 10.5' FT. BELOW GRADE

REMARKS: Samples from 4 to 8' blocked by gravel from beneath asphalt. Grey-brown fill likely extends from 4.5 to 9.6' based on blow counts.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-2'				<u>ASPHALT</u> : Underlain by gravel.
2-4.5'	2-4'	3,4,4,8	16	<u>SAND AND SILT</u> : Very fine, moderately well sorted; trace gravel, angular to subangular; dry; tan; trace root fragments.
4.5-9.6'	4-6'	13,3,3,2	0	<u>FILL</u> : Gray brown to black; trace fibrous.
	6-8'	3/24"	0	
	8-10'	5,7,14,10	9	
9.6-10'				<u>SILT</u> : Some clay, fine sand; tan.
10-12'	10-12'			<u>SAND</u> and <u>GRAVEL</u> : Subangular to rounded, to 3/4" diameter; poorly sorted; brown, red, tan, white; silt and clay matrix, gray-green
12'				END OF BORING



TEST BORING LOG

SHEET 1 OF 2

BORING NO: B-5

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Northeast Side of Active Landfill on Upper Rd

DATE(S) DRILLED: 07/17/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING METHOD: Hollow Stem Auger

BORING DIAMETER: 6"

SAMPLING METHOD: Split-Spoon

TOTAL DEPTH: 20'

BACKFILL MATERIAL AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO STATIC WATER: 19.9 FT. BELOW GRADE

REMARKS: Fill/clay interface sharp, defined by sand layer.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-0.2'	0-2'	3,4,6,7	21	<u>COVER SOIL</u> : Tan; root fragments.
0.2-17.6'				<u>FILL</u> : Dark gray; dry to slightly moist. Becomes moist.
	2-4'	4,5,5,5	24	
	4-6'	2,4,3,4	0	
	6-8'	4,6,4,7	10	
	8-10'	3,3,4,5	17	
	10-12'	4,5,3,6	24	Sand lense at 11.9-12.0'; very fine to fine well sorted; some silt; tan; moist.
	12-14'	5,6,5,4	24	Fill as above.
	14-16'	3,3,3,3	20	
	16-18'	4,5,4,7	16	
17.6-17.8'				<u>SAND</u> : Medium; little silt; trace clay mottled brown and black.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY (in.)	CLASSIFICATION
17.8-19.9'	18-20'	5,50/3"	4	Becomes Clay.
19.9-20.0'				<u>WEATHERED LIMESTONE</u> : Wet; trace sand and clay; trace black mottling.
20.0'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-6

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Between W-11 and W-12

DATE(S) DRILLED: 07/18/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING METHOD: H.S. Auger

BORING DIAMETER: 6"

SAMPLING METHOD: Split-Spoon

TOTAL DEPTH: 10'

BACKFILL MATERIAL AND METHOD: Cuttings topped with grout

LOGGED BY: J. Schindler

DEPTH TO STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV-ERY	CLASSIFICATION
0-1'				<u>ASPHALT</u>
1-7.5'	2-4'			<u>FILL</u> : Dry; mottled tan to gray.
	4-6'			
	6-8'	2/24"	11	
7.5-8.9'				<u>FILL</u> : Dark gray to black, moist.
	8-10'	1,2,5,9	24	
8.9-10'				<u>SILT</u> : Little clay, fine sand; dense; tan
10'				END OF BORING.



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-7A

PROJECT: Raymark Manheim, PA Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Adjacent to W-12

DATE(S)
DRILLED: 07/18/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Hollow Stem Auger

BORING
DIAMETER: 6"

SAMPLING
METHOD: Split-Spoon

TOTAL
DEPTH: 13'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS: Boring conducted to retrieve waste sample for analysis. See W-12 for complete log.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
	11-13' 13'	3,4,5,6	24	<u>CLAY</u> END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-7B

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Adjacent to W-12, SE of B-7A

DATE(S)
DRILLED: 07/18/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Hollow Stem Auger

BORING
DIAMETER: 6" | SAMPLING
METHOD: Split-Spoon

TOTAL
DEPTH: 6'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS: Boring conducted to retrieve waste sample for analysis. See Well W-12 for complete log.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
	4-6' 6'	3/24"	14	<u>FILL</u> : Bark gray-brown. END OF BORING



TEST BORING LOG

SHEET 1 OF 2

BORING NO: 8-9

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Northern Portion of Landfill

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Hollow Stem AugerBORING
DIAMETER: 6" SAMPLING
METHOD: Split-SpoonTOTAL
DEPTH: 22'BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: 21.6 FT. BELOW GRADE

REMARKS: Fill/silt interface sharply defined.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-0.4'	0-2'	12,11,9,17	12	<u>GRAVEL FILL</u> : Crushed limestone; gray.
0.4-11.2'				<u>FILL</u> : Dark gray; dry.
	2-4'	11,12,7,10		
	4-6'	3,5,4,3	3	Stiff cloth material in tip of spoon.
	6-8'	4,6,4,6	3	
	8-10'	2,2,3,4	24	Becomes slightly moist.
	10-12'	3,5,7,8	18	
11.2-19.3'				<u>FILL</u> : Trace fine sand, gravel, rounded to angular; dry; gray-green mottled with black and brown.
	12-14'	4,7,11,10	10	Trace to little clay, slightly moist.
	14-16'	6,12,14,13	16	0.5 inch layers of wood chips.
	16-18'	4,4,6,7	20	Little to some clay; mm dark brown and black banding.
	18-20'	4,12,12,14	20	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY (in)	CLASSIFICATION
19.3-22				GRAVEL: subangular to angular; poorly sorted; some silt; medium sand; trace clay moist.
22'	20-22'	6,3,2,1	9	Large gravel. END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-10A

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: 30' East of Gasoline Tank

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 3'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler and J. Donnell

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-3' 3'				Tan sand and silt. END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-10B

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: 46' Northwest of B-10A

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" | SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 5'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECCV- ERY	CLASSIFICATION
0-3' 3-5' 5'				<u>FILL</u> : Dark gray-brown. <u>SAND</u> and <u>SILT</u> : Tan. END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-11A

PROJECT: Raymark Manheim, PA Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Southwest of Building No. 57 Foundation

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 5'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler and J. Donnell

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-3'				<u>FILL</u> : Black to dark gray-brown.
3-5'				<u>SAND</u> and <u>SILT</u> : Tan.
5'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-11C

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Between B-11A and B-11B

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 2'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler and J. Donnell

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-1'				<u>FILL</u> : Dark gray-brown to black.
1-2'				<u>SAND</u> and <u>SILT</u> : Tan.
2'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-12

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Top of Earthen Berm Near Corner

DATE(S)
DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 8'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-2'				<u>SILT</u> : Tan.
2-6'				<u>FILL</u> : Black to dark gray-brown.
6-8'				<u>SAND</u> and <u>SILT</u> : Tan.
8'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-13

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: On Crown Vetch

DATE(S) DRILLED: 07/21/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING METHOD: Hollow Stem Auger

BORING DIAMETER: 6"

SAMPLING METHOD: Auger Cuttings

TOTAL DEPTH: 12'

BACKFILL MATERIAL AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-2'				<u>SAND</u> and <u>SILT</u> : Tan.
2-8'				<u>FILL</u> : Black.
8-11.5'				<u>CLAY</u> : Gray.
11.5-12'				<u>GRAVEL</u> and <u>SAND</u>
12'				END OF BORING

BCM**TEST BORING LOG**

SHEET 1 OF 1

BORING NO: B-14

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: Between W-3 and W-15

DATE(S)
DRILLED: 07/21-22/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: AugerBORING DIAMETER: 6" SAMPLING
METHOD: Auger CuttingsTOTAL
DEPTH: 20'BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Schindler

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-0.5'	0-2.5'			Asphalt and gravel.
0.5-12.5'				<u>FILL</u> : Sand and gravel dark gray; str ^o dc trash; braided steel hose, blue plastic tubing.
	2.5-5.0'			
	5.0-7.5'			
	7.5-10.0'			Moist at 8'; less gravel at 10'.
12.5-19'	12.5-15'			<u>CLAY</u> : Dark gray.
	15-17.5'			Becomes gray-green, little gravel.
	17.5-20'			Hard object encountered at 18'.
19-20'				<u>SAND</u> and <u>GRAVEL</u> : Tan; gravel to 2" diamete rounded.
20'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-16

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4174-20

BORING LOCATION: 40 South of Gasoline Tank Near Foundation

DATE(S) DRILLED: 07/22/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING METHOD: Auger

BORING DIAMETER: 4"

SAMPLING METHOD: Auger Cuttings

TOTAL DEPTH: 6'

BACKFILL MATERIAL AND METHOD: Cuttings/Grout

LOGGED BY: J. Donnell

DEPTH TO STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-3'				<u>SILT</u> and <u>SAND</u> : Tan.
3-6'				<u>CLAY</u> : Pale brown.
6'				END OF BORING



TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-17

PROJECT: Raymark Manheim, Landfill Closure

PROJECT NO: 00-4170

BORING LOCATION: Adjacent to Building No. 57 Foundation

DATE(S)
DRILLED: 07/22/86

DRILLING CONTRACTOR: Pennsylvania Drilling Co.

DRILLING
METHOD: Auger

BORING
DIAMETER: 4" SAMPLING
METHOD: Auger Cuttings

TOTAL
DEPTH: 5'

BACKFILL MATERIAL
AND METHOD: Cuttings/Grout

LOGGED BY: J. Donnell

DEPTH TO
STATIC WATER: FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOV- ERY	CLASSIFICATION
0-2' 2-5' 5'				<u>FILL</u> : <u>FILL</u> and <u>CLAY</u> : Light brown. END OF BORING

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 1

WELL W1

<u>LOG</u>	<u>DESCRIPTION</u>
0-22	Fill
22-200	Limestone

COMPLETED: 5/14/75
ELEVATION (TOC): 410.4'
TOTAL DEPTH: 200'
TOTAL CASED: 29'
ESTIMATED YIELD: 0.1 gpm
PROBABLE WATER ZONE: 40'

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 2
WELL W2

<u>LOG</u>	<u>DESCRIPTION</u>
0-21.5	Fill
	Limestone

COMPLETED: 5/14/75
ELEVATION (TOC): 413.0'
TOTAL DEPTH: 75'
TOTAL CASED: 24.5'
ESTIMATED YIELD: 3 gpm
FIRST WATER ZONE: 71'

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 3

WELL W3

<u>LOG</u>	<u>DESCRIPTION</u>
0-8	Fill
8-13	Gravelly Soil
13-35	Limestone

COMPLETED: 5/14/75
ELEVATION (TOC): 401.5'
TOTAL DEPTH: 35'
TOTAL CASED: 20'4"
ESTIMATED YIELD: 25-50 gpm
FIRST WATER ZONE: 30'

WELL LOG
OF
R. M. FRICTION MATERIALS COMPANY
LANDFILL MONITORING WELLS

MONITORING POINT 4

WELL W4

<u>LOG</u>	<u>DESCRIPTION</u>
0-10	Topsoil
10-12	Gravelly Soil
12-18	Weathered Bedrock
18-25	Crevised Limestone
41-44	Void

COMPLETED: 5/14/75

ELEVATION (TOC): 399.0'

TOTAL DEPTH: 44'

TOTAL CASED: 26'

ESTIMATED YIELD: 100 gpm

FIRST WATER ZONE: 41'